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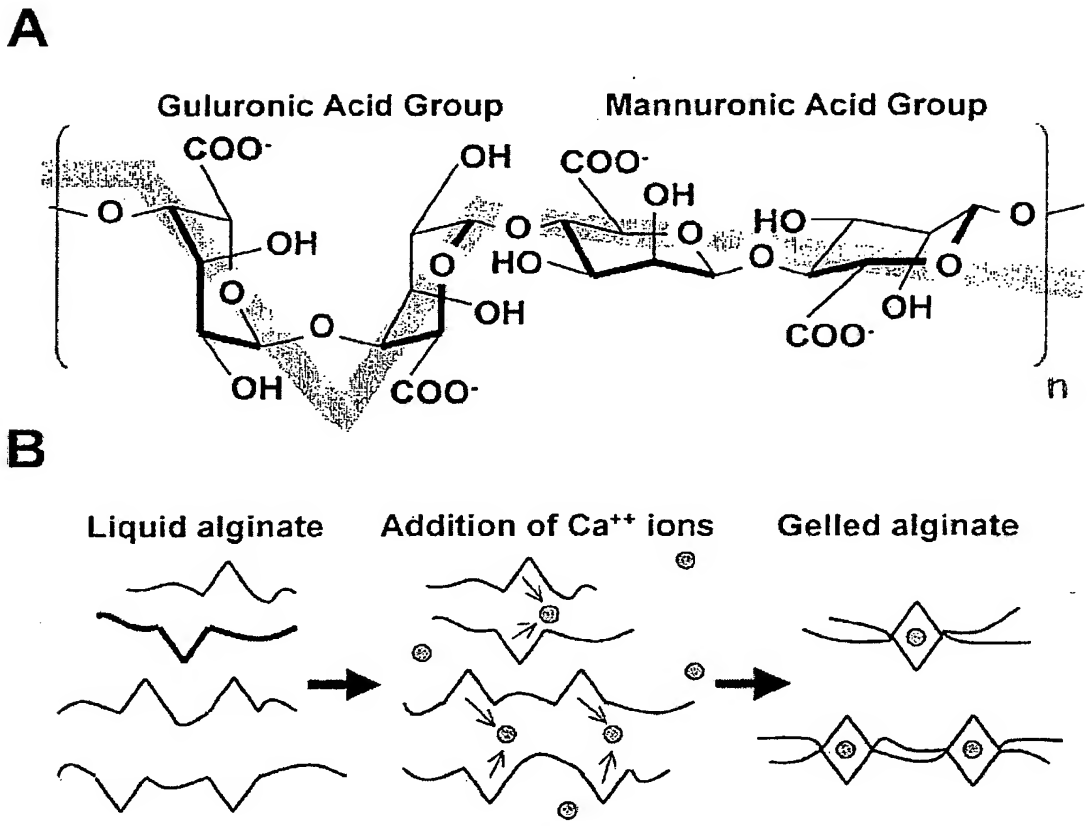
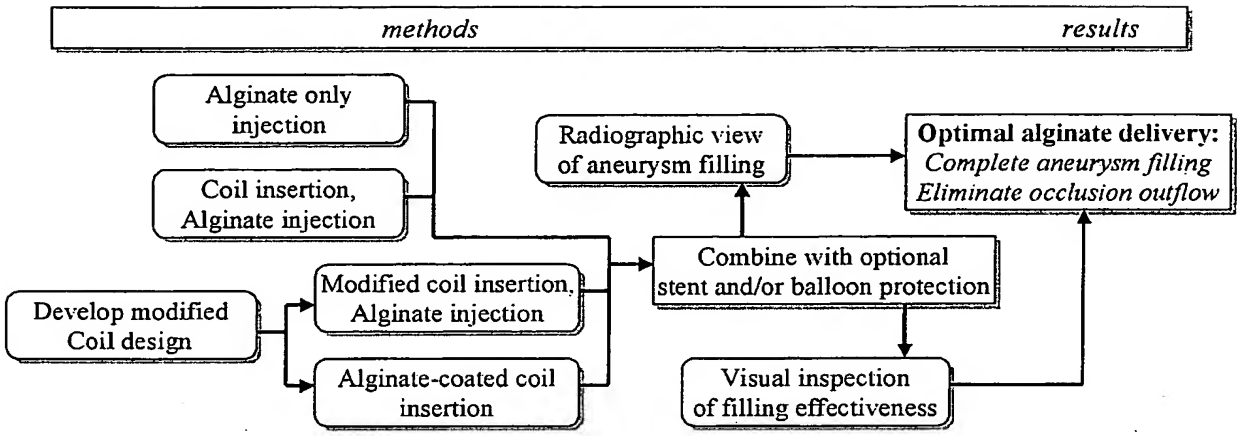


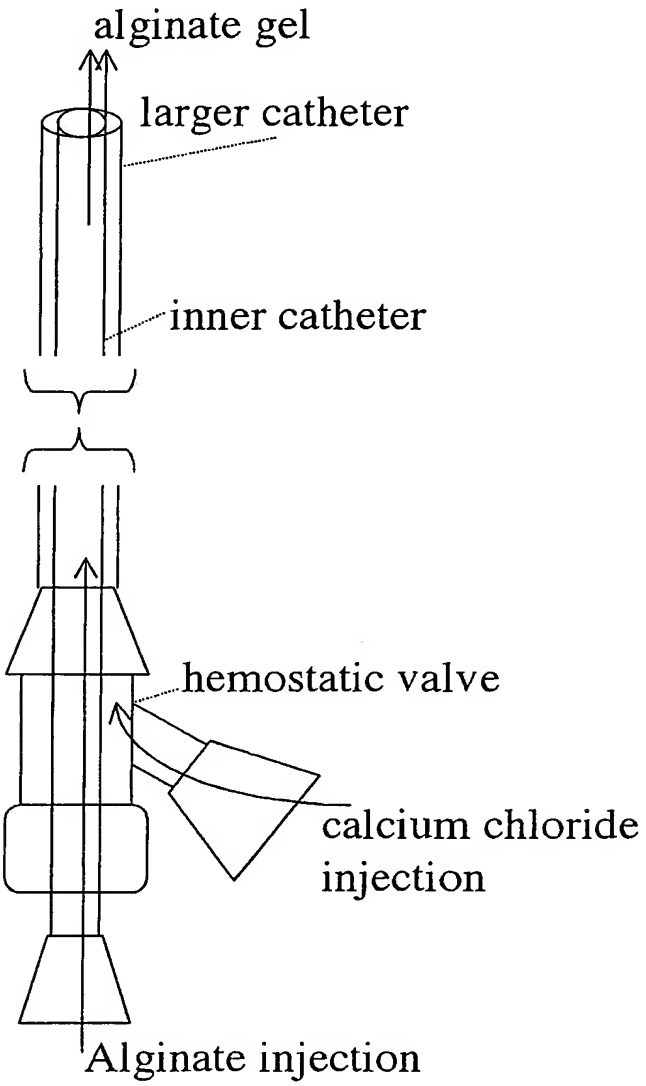
Alginate structure and reaction mechanism. (A) Alginate is a polysaccharide copolymer made of guluronic (G) and mannuronic (M) acid groups. The stereochemistry of the G acid provides reactive carboxylic acid sites. The M acids are not reactive. (B) In the presence of divalent calcium ions, the calcium is ionically substituted at the carboxylic site. A second alginate strand can also connect at the calcium ion, forming a link in which the Ca ion attaches two alginate strands together. The result is a chain of calcium linked alginate strands that form a solid gel.

Figure 1.



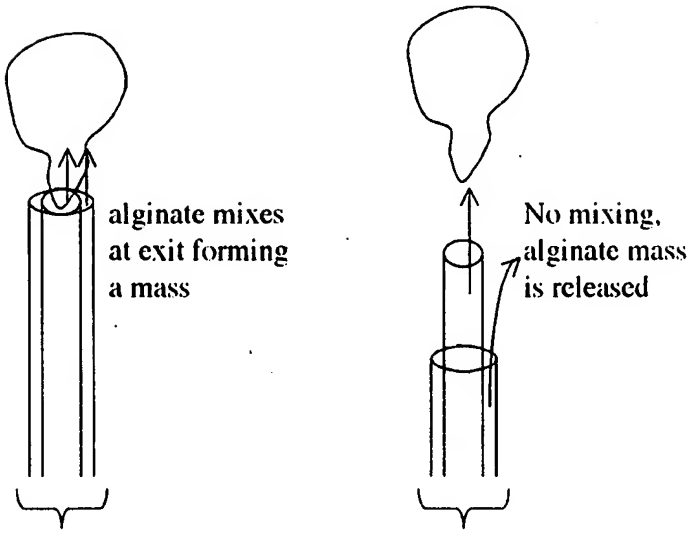
Flow diagram summary of alginate and coil occlusion options

Figure 2.



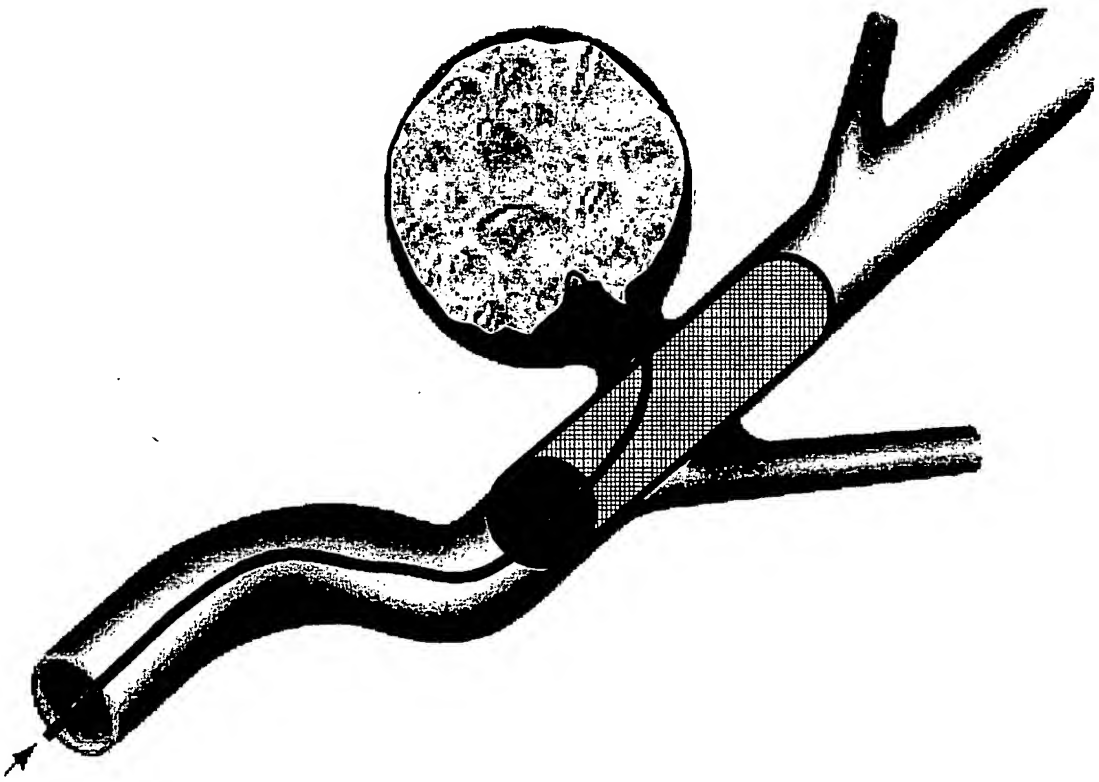
Concentric tube catheter design that improves control of alginate injection

Figure 3.



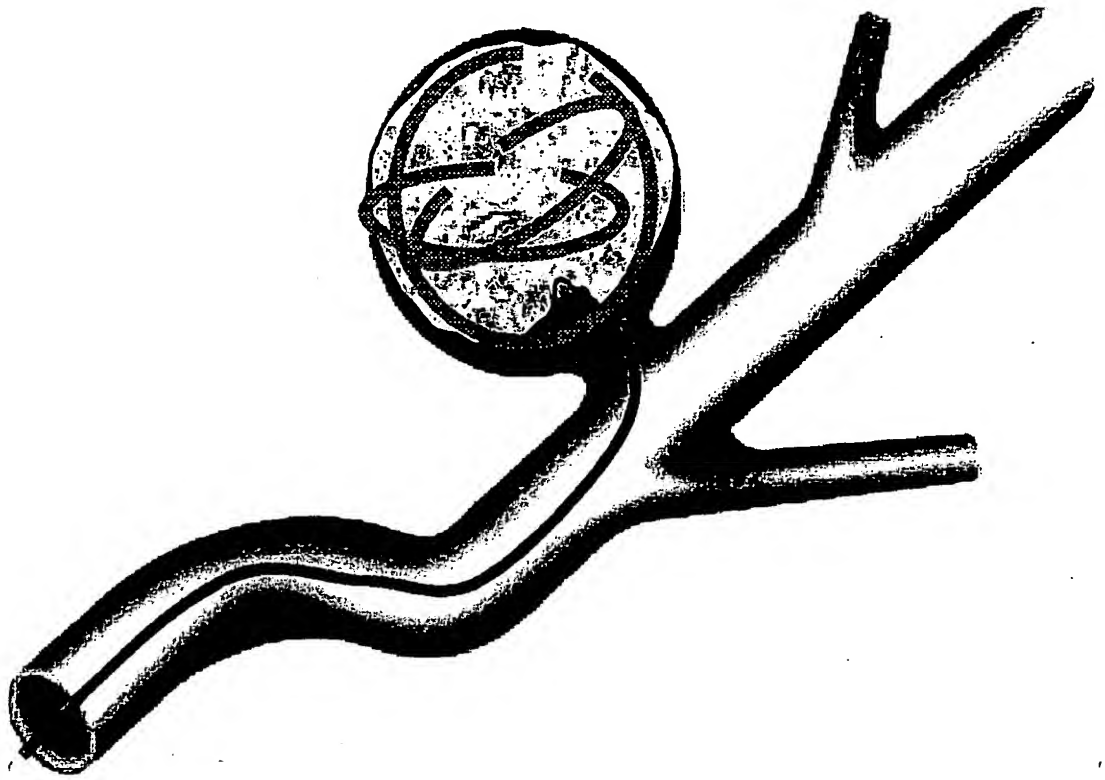
a) alginate mass formation b) release of alginate mass/strand

Figure 4.



Stent placement and alginate injection to completely fill the aneurysm

Figure 5.

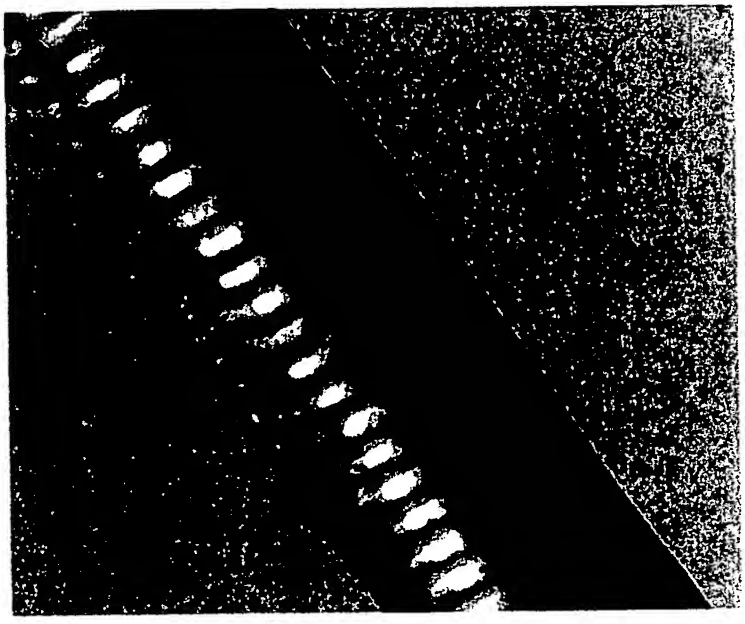


Partial aneurysm filling with coils, complete filling of remaining volume with alginate

Figure 6.

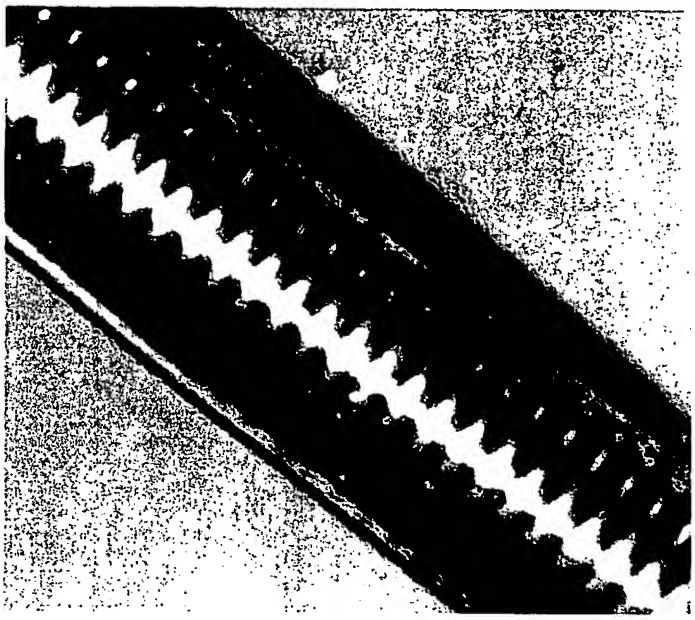
Alginate coated coil, 3X diameter increase

Figure 7A.



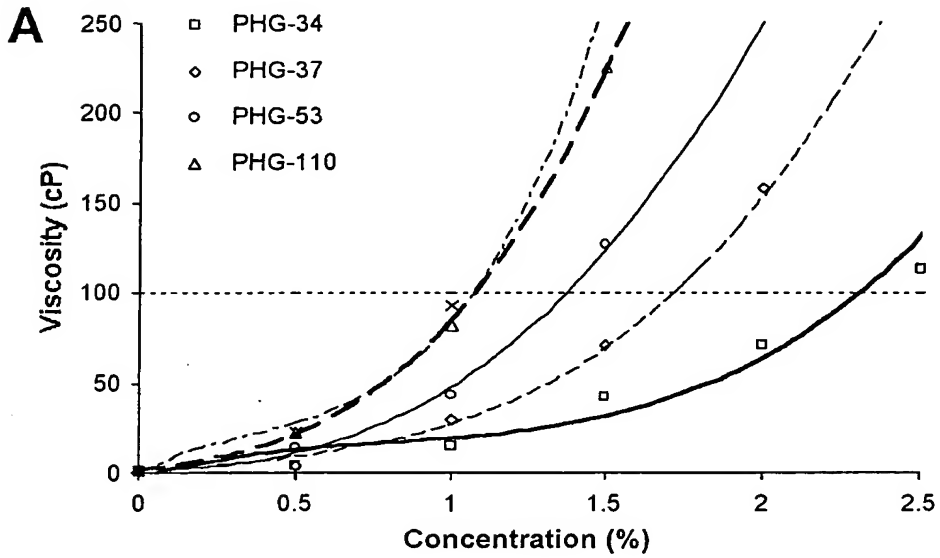
Dehydrated coil, 1.08X

Figure 7B.



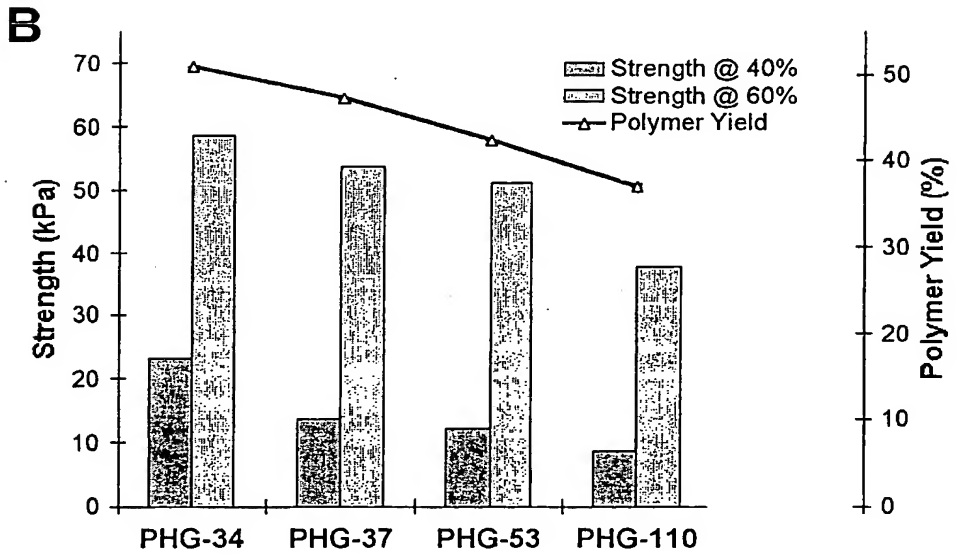
Rehydrated 5 minutes, 1.7X

Figure 7C.



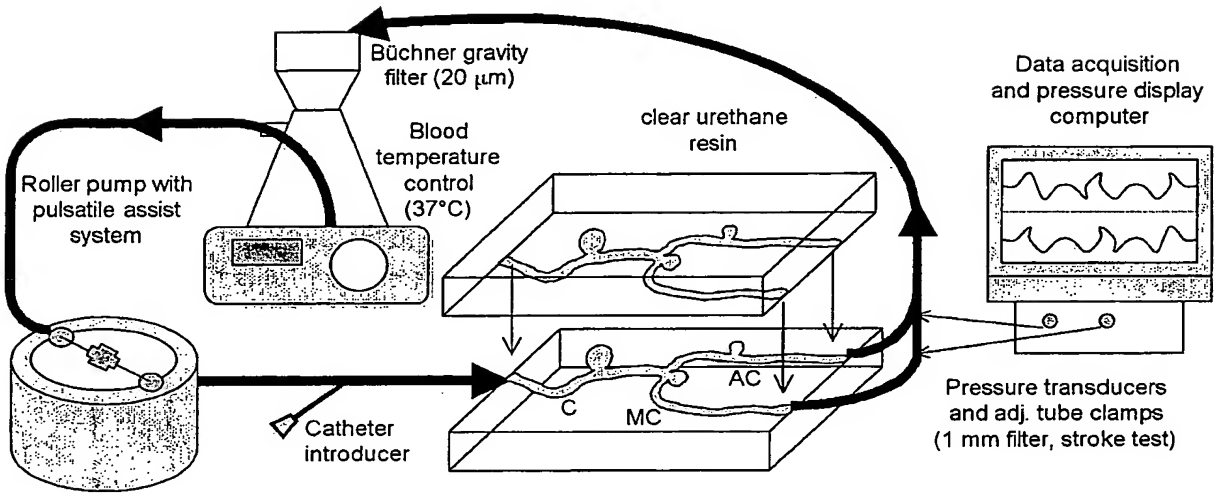
Viscosity versus concentration of various aliginate molecular weights (apparent viscosities)

Figure 8A.



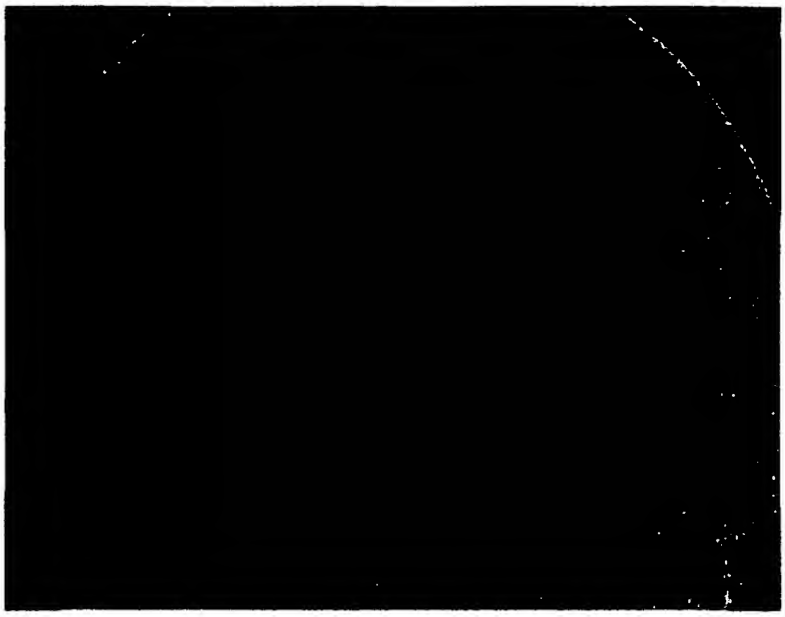
Alginate strength and polymer yield versus various alginate molecular weights (apparent viscosities)

Figure 8B.



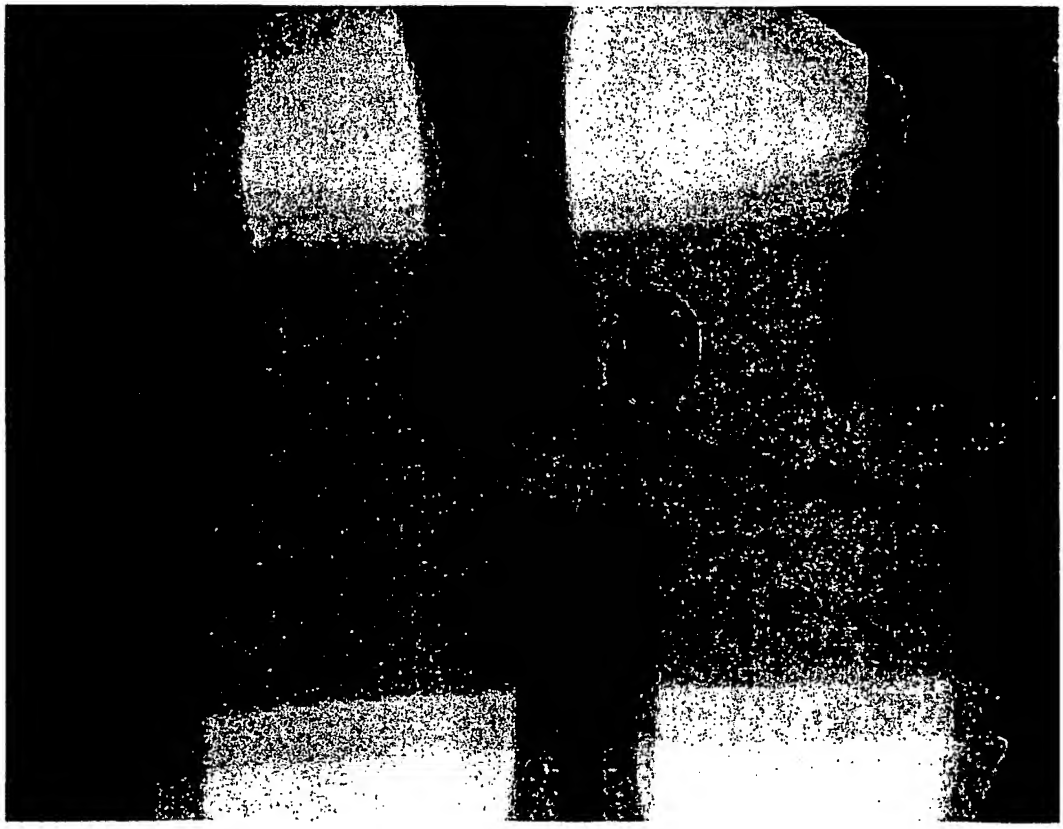
In vitro vessel cast aneurysm model setup

Figure 9.



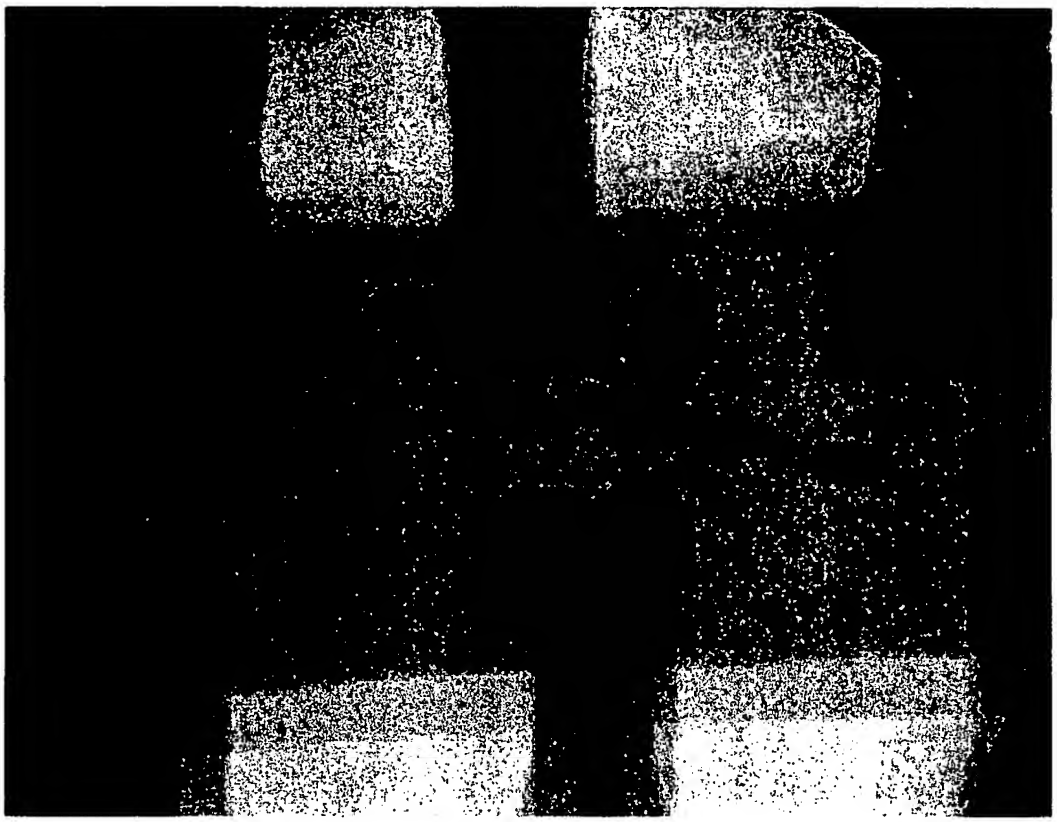
Pre-embolization of a small-neck aneurysm

Figure 10A.



Coil delivery, partial aneurysm filling, < 5% of vol.

Figure 10B.

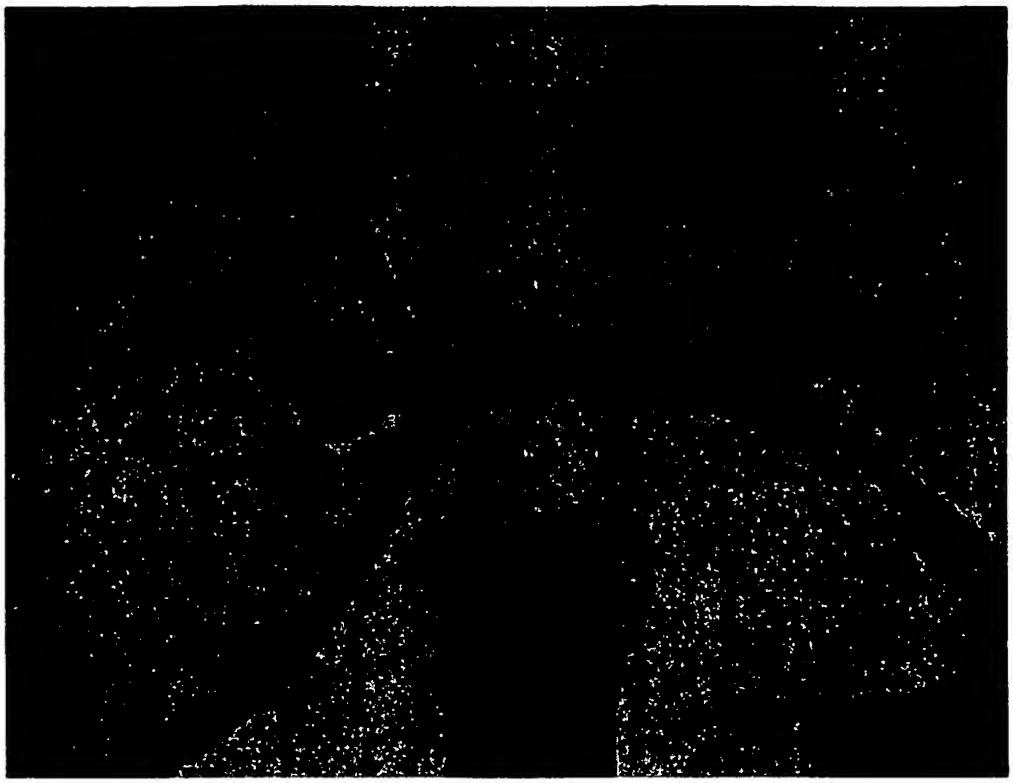


Alginate filling of remaining aneurysm volume, 90-100% of vol.

Figure 10C.

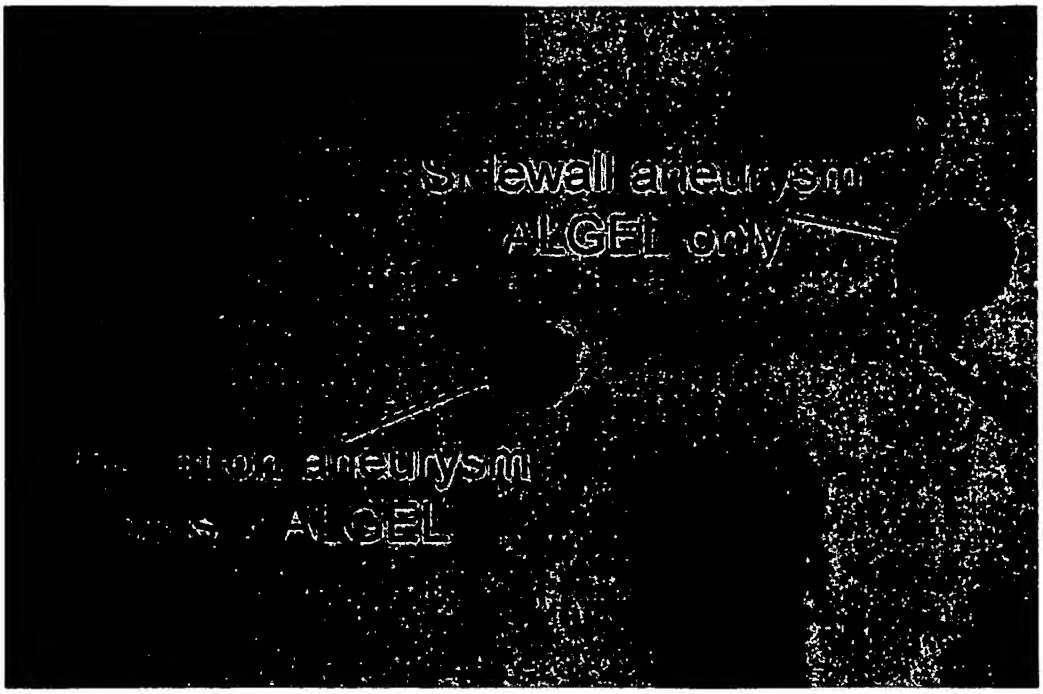
Post-embolization, complete aneurysm filling

Figure 10D.



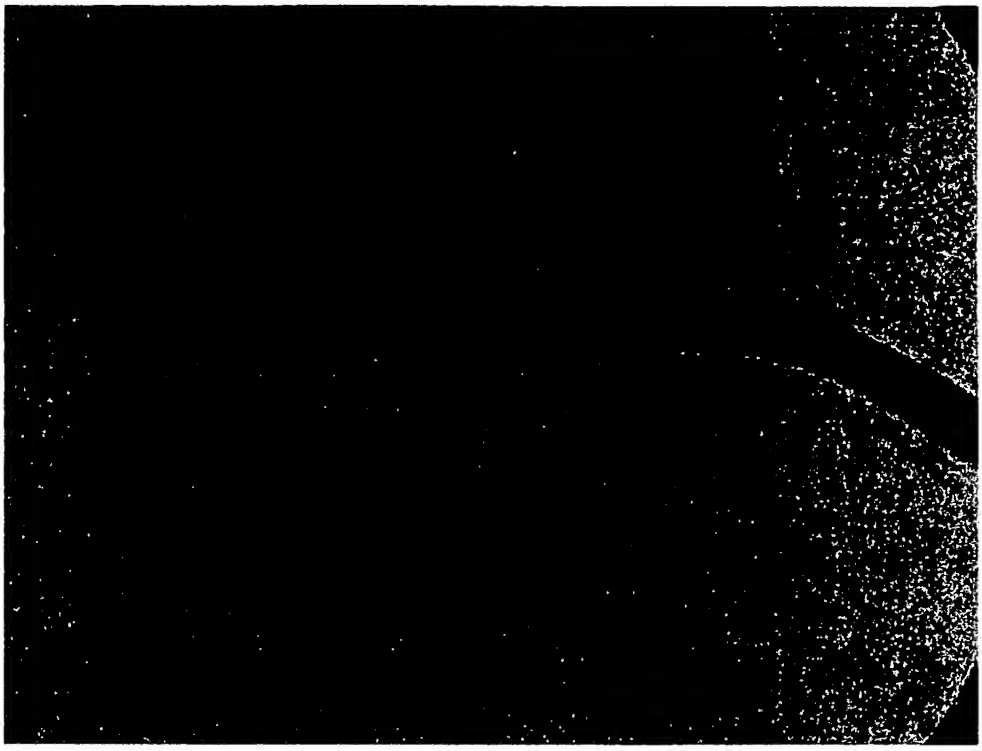
Pre-embolization

Figure 11A.



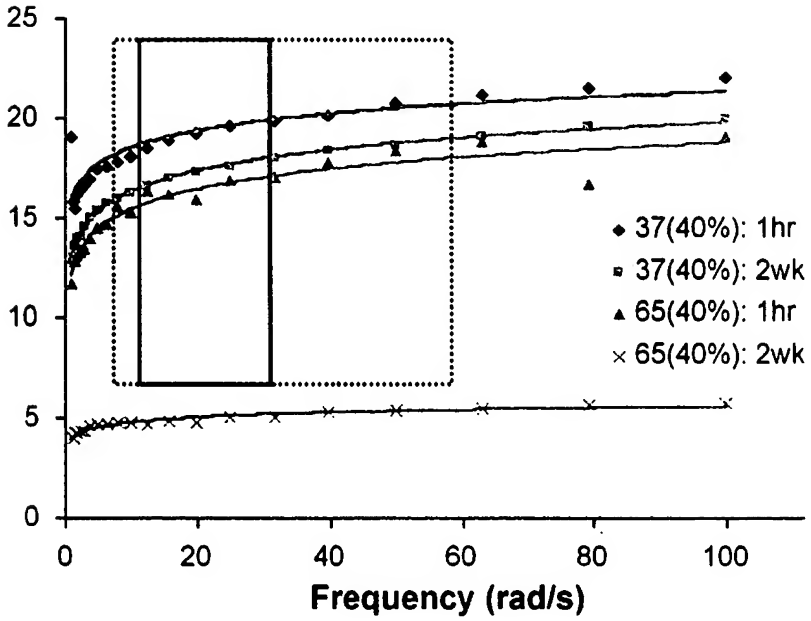
Addition of unmodified coils and alginate

Figure 11B.



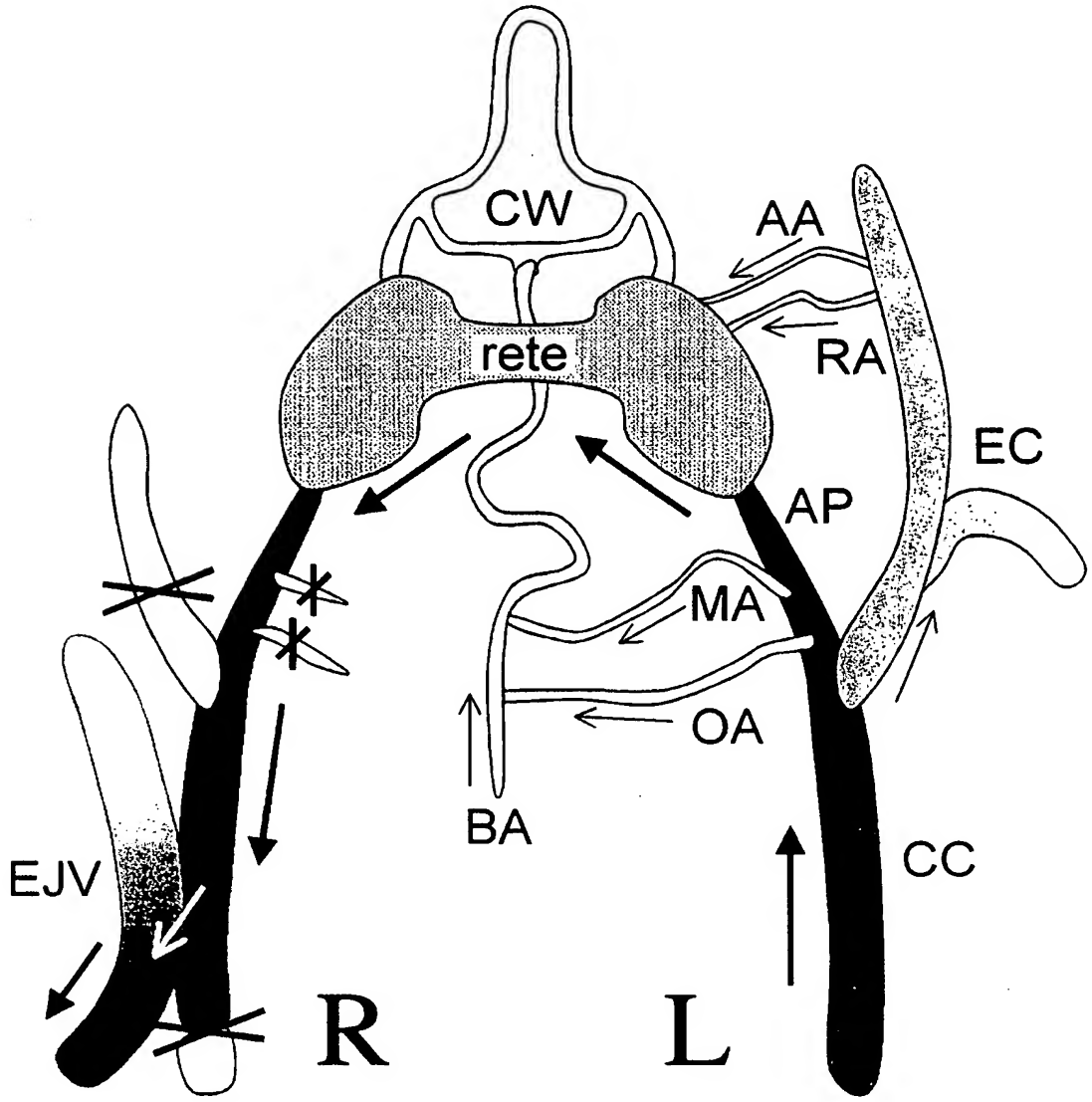
Post-embolization complete occlusion

Figure 11C.



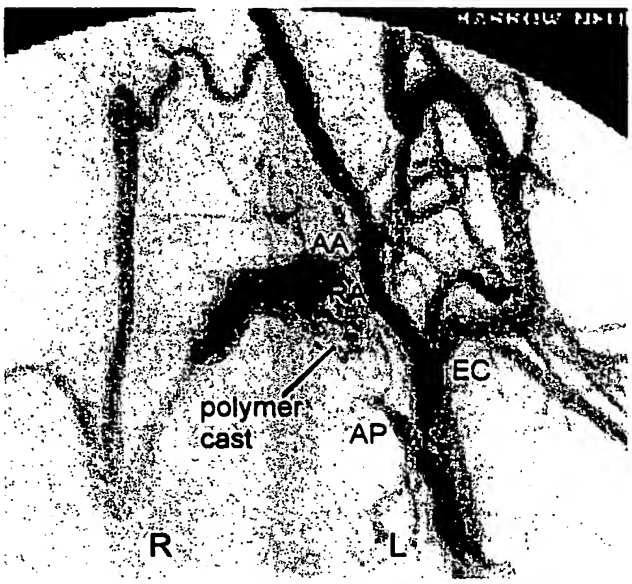
Mechanical stability of high and low molecular weight alginate and change over 2 weeks in in vitro aneurysm model

Figure 12.



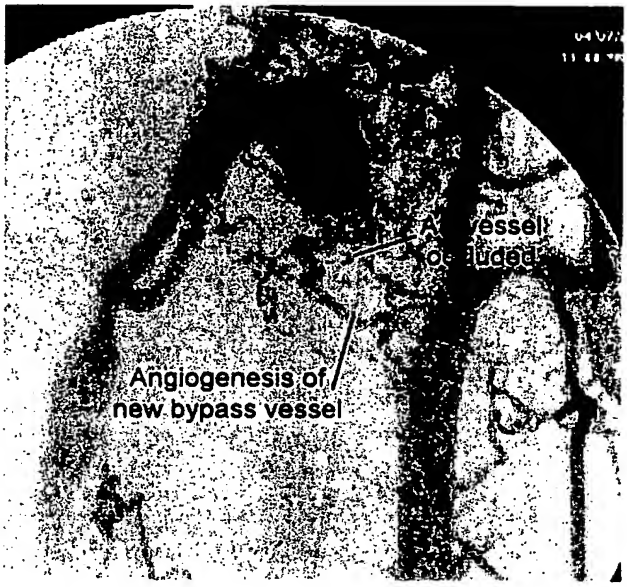
Swine rete mirabile structure and anastomosis procedure

Figure 13.



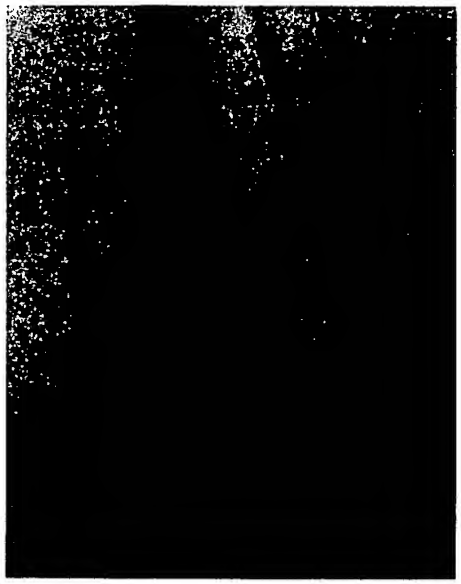
Flow immediately after occlusion. Flow in the AP vessel is stopped, yet the AA and RA vessels maintain flow to the RM and CW.

Figure 14.



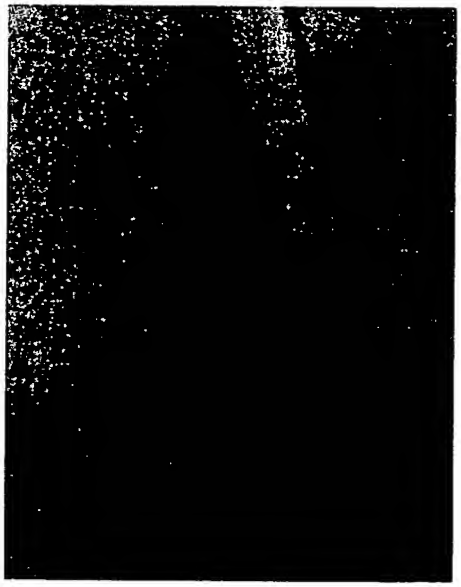
AP occlusion sustained after 6 months. Image shows signs of angiogenesis, a new vessel has formed to feed the base of the RM

Figure 15.



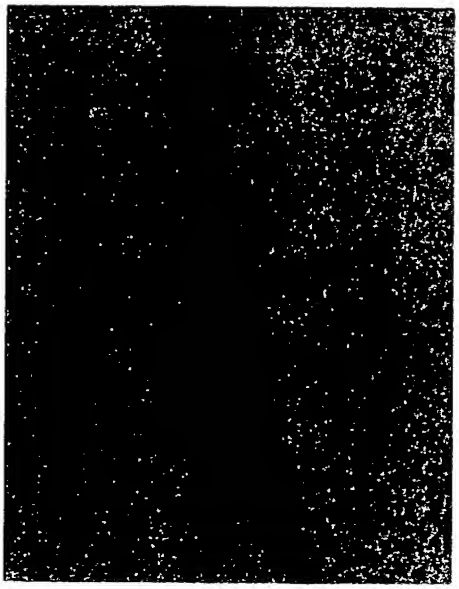
Pre-embolization of in vivo aneurysm model

Figure 16A.



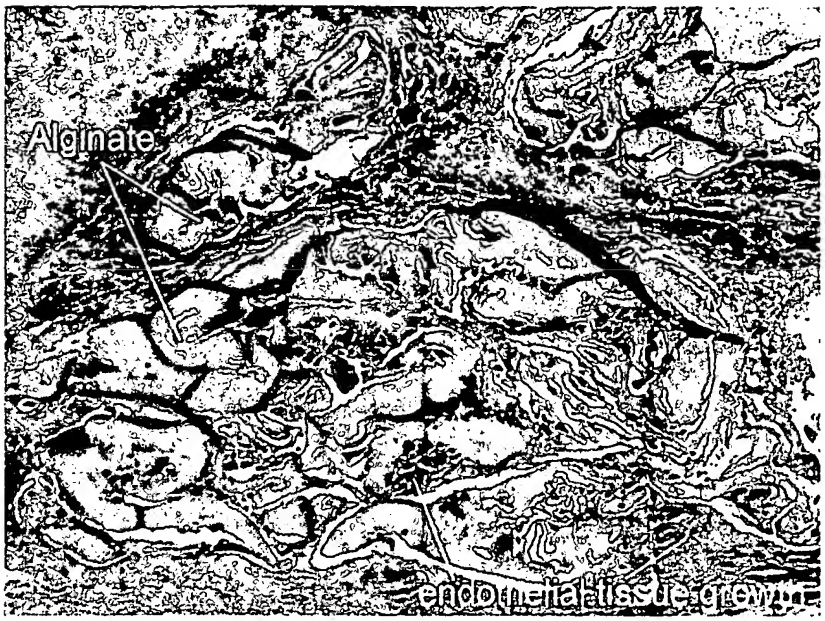
Alginate occlusion with balloon protection to completely fill the aneurysm sac

Figure 16B.



Post-embolization, complete occlusion of aneurysm with no parent vessel occlusion

Figure 16C.



Alginate occlusion in the RM after six months. Tissue encapsulation and endothelial growth surrounds and penetrates the gel.

Figure 17.